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Probing biological light-harvesting phenomena by optical cavities

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Abstract

We propose a driven optical cavity quantum electrodynamics (QED) setup aimed at directly probing energy transport dynamics in photosynthetic biomolecules. We show that detailed information concerning energy transfer paths and delocalization of exciton states can be inferred (and exciton energies estimated) from the statistical properties of the emitted photons. This approach provides us with a spectroscopic tool to interrogate biological systems in terms of quantum optical phenomena which have usually been studied in solid-state or atomic systems (e.g., semiconductor quantum dots and trapped atoms) and which are now extended to a broader range of spectroscopy experiments. © 2012 American Physical Society.

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